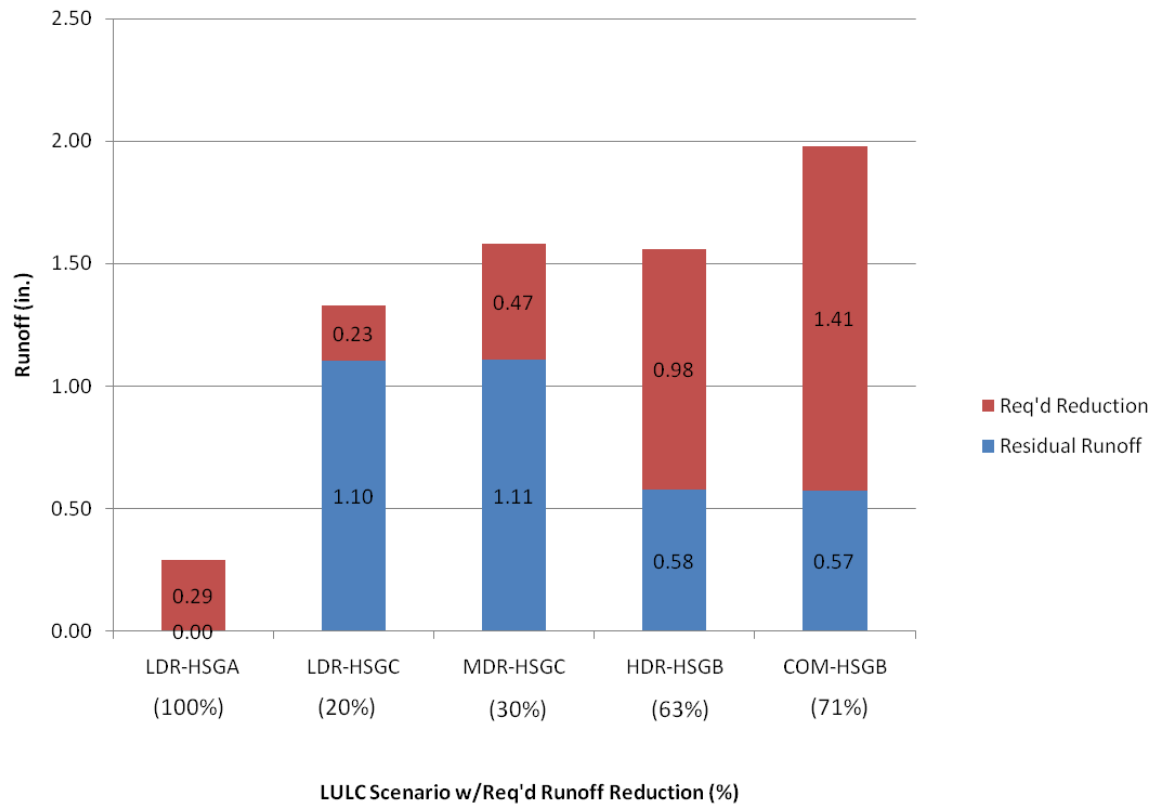


Proposed Revisions to Delaware Sediment & Stormwater Regulations

Fee-In-Lieu Example

Runoff Reduction for Various LULC Scenarios



Key

LDR-HSGA: Low Density Residential, 20% Imp., HSG A

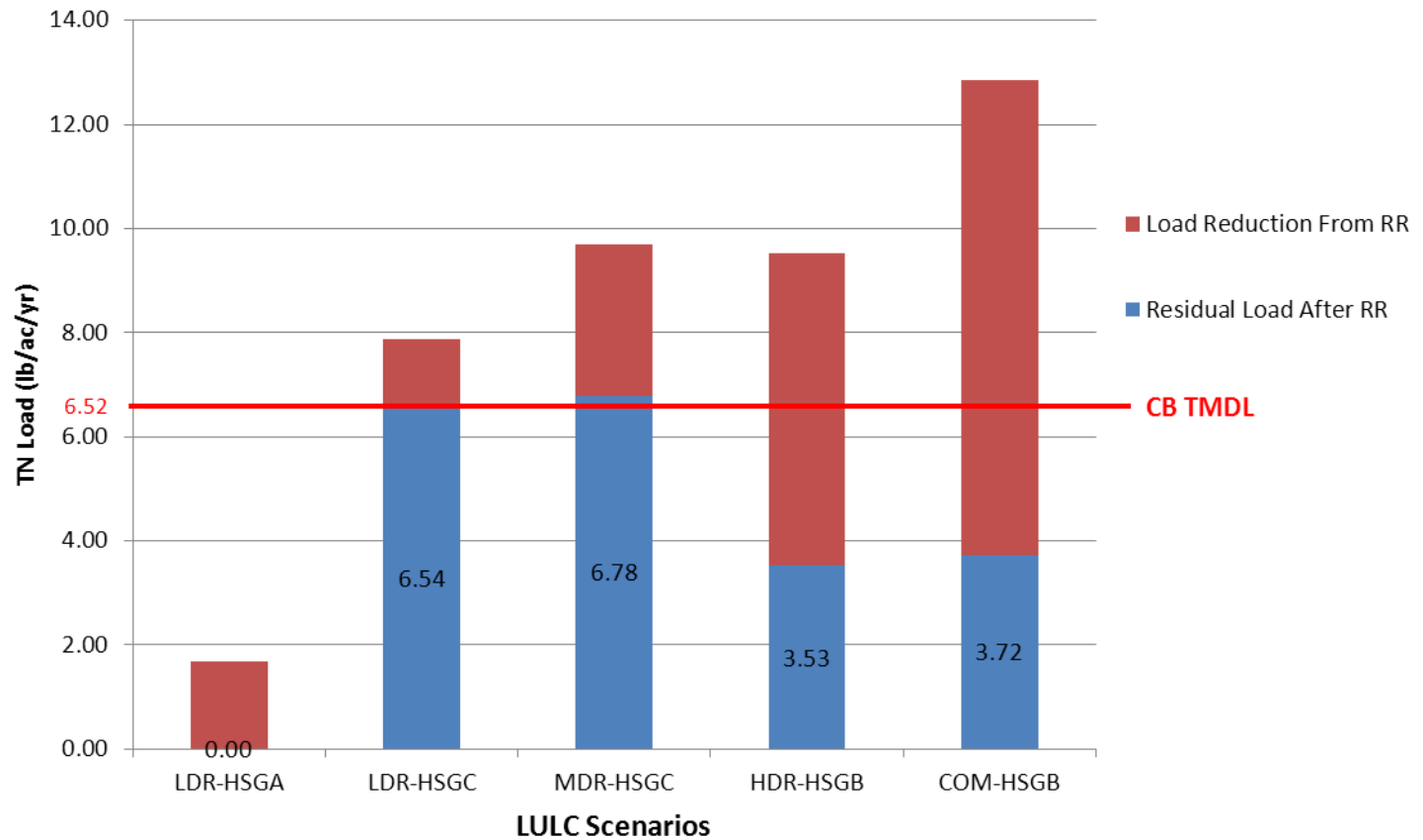
LDR-HSGC: Low Density Residential, 20% Imp., HSG C

MDR-HSGC: Medium Density Residential, 40% Imp., HSG C

HDR-HSGB: High Density Residential, 60% Imp., HSG B

COM-HSGB: Commercial, 80% Imp., HSG B

TN Reduction for Various LULC Scenarios



Key

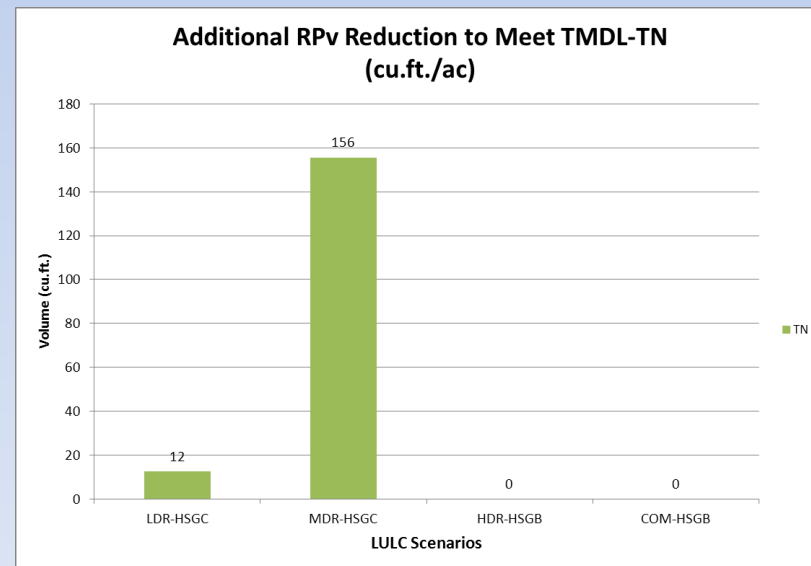
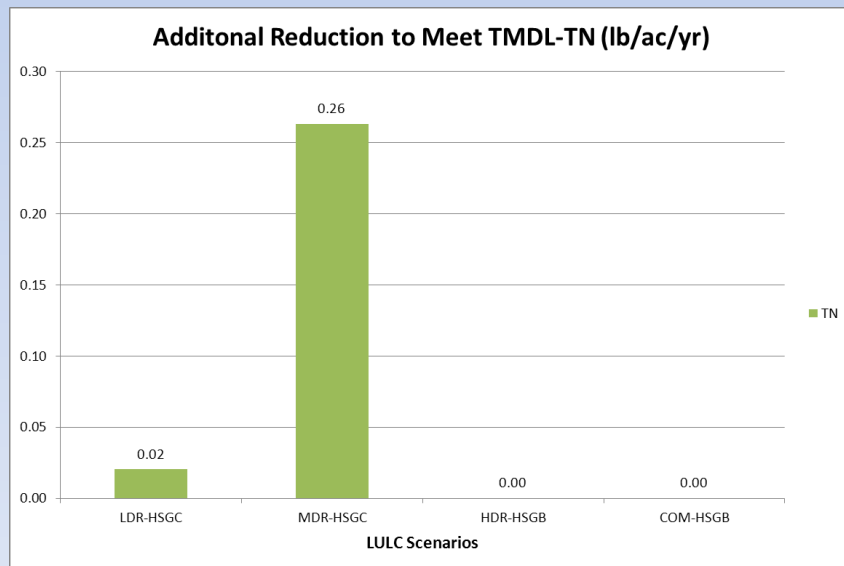
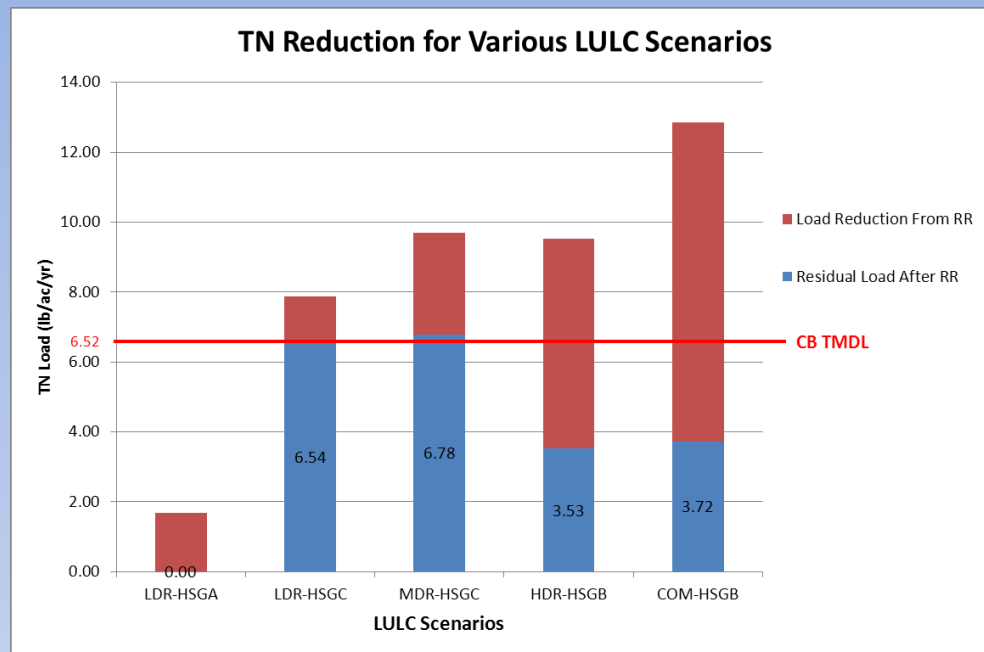
LDR-HSGA: Low Density Residential, 20% Imp., HSG A

LDR-HSGC: Low Density Residential, 20% Imp., HSG C

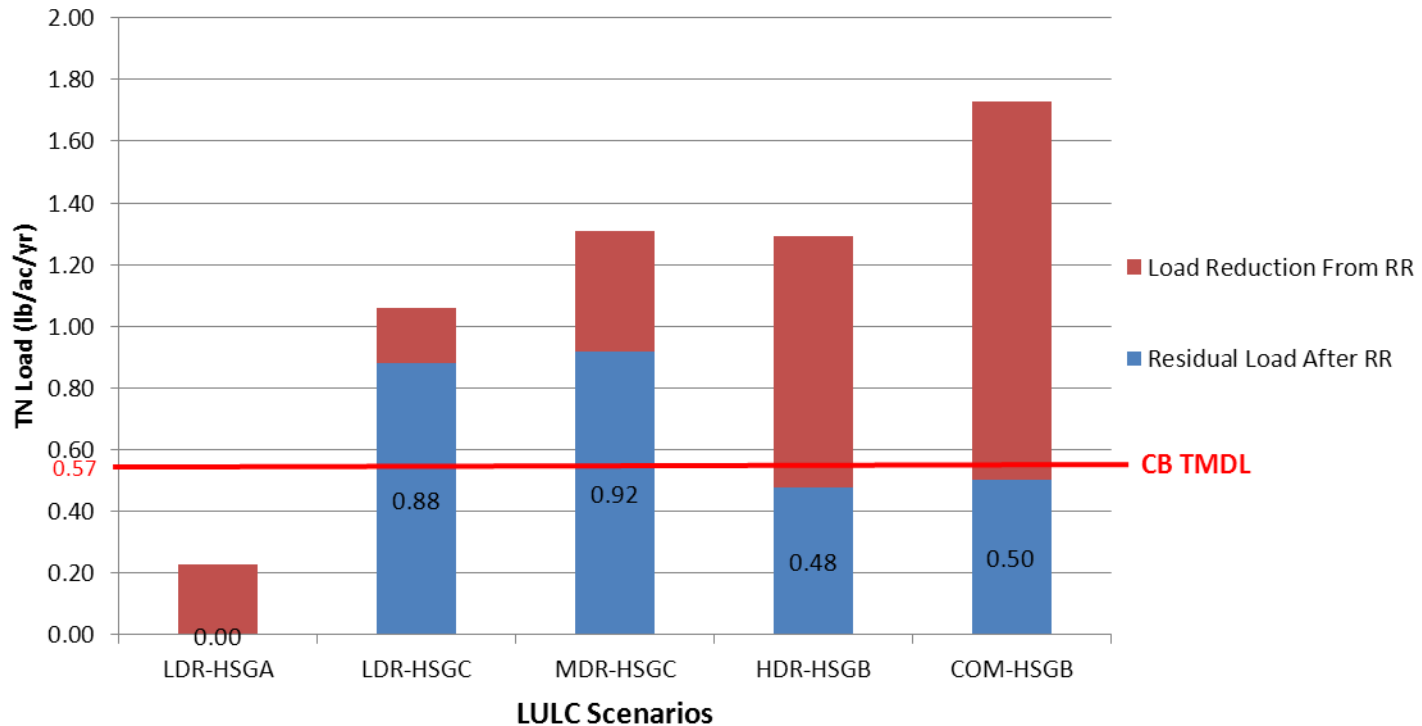
MDR-HSGC: Medium Density Residential, 40% Imp., HSG C

HDR-HSGB: High Density Residential, 60% Imp., HSG B

COM-HSGB: Commercial, 80% Imp., HSG B



TP Reduction for Various LULC Scenarios



Key

LDR-HSGA: Low Density Residential, 20% Imp., HSG A

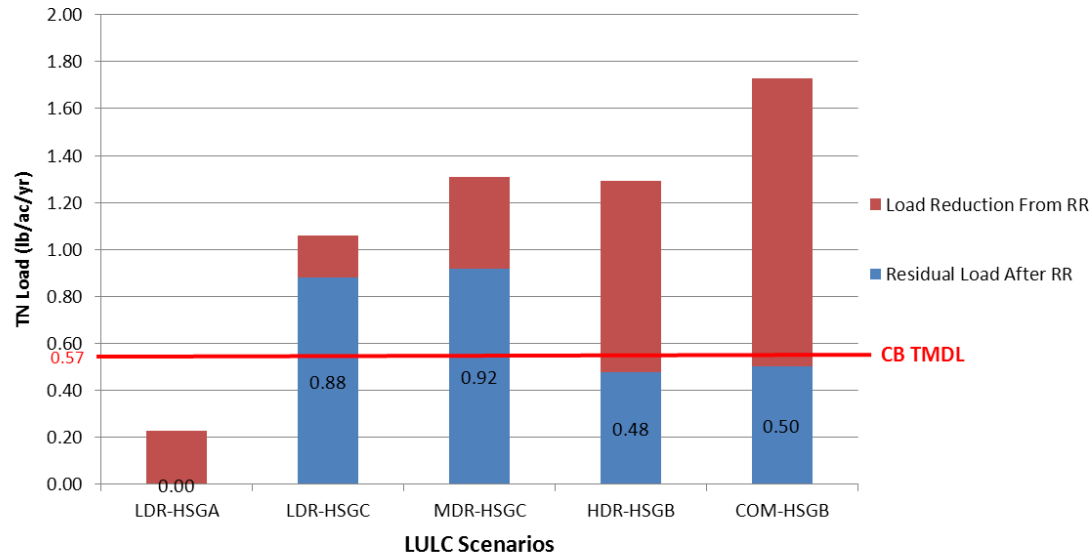
LDR-HSGC: Low Density Residential, 20% Imp., HSG C

MDR-HSGC: Medium Density Residential, 40% Imp., HSG C

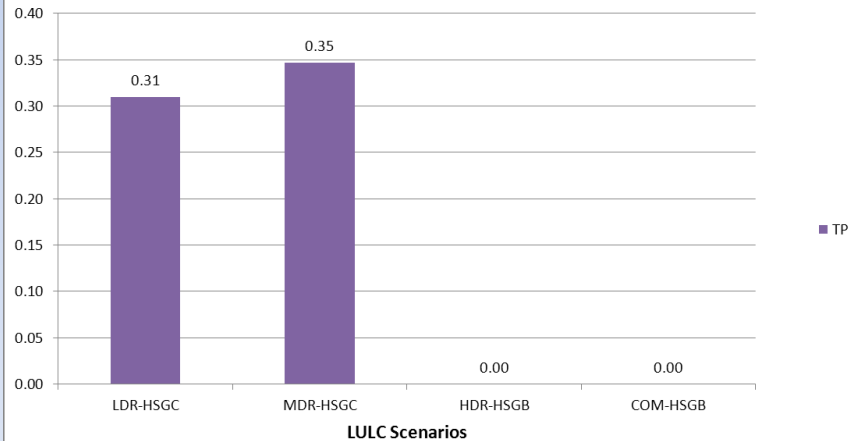
HDR-HSGB: High Density Residential, 60% Imp., HSG B

COM-HSGB: Commercial, 80% Imp., HSG B

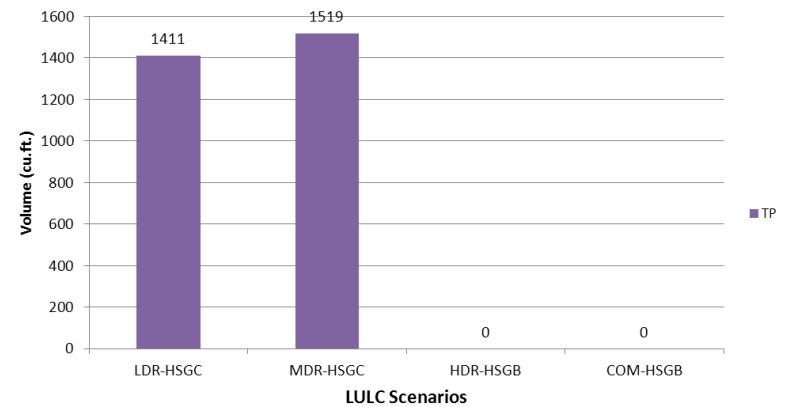
TP Reduction for Various LULC Scenarios



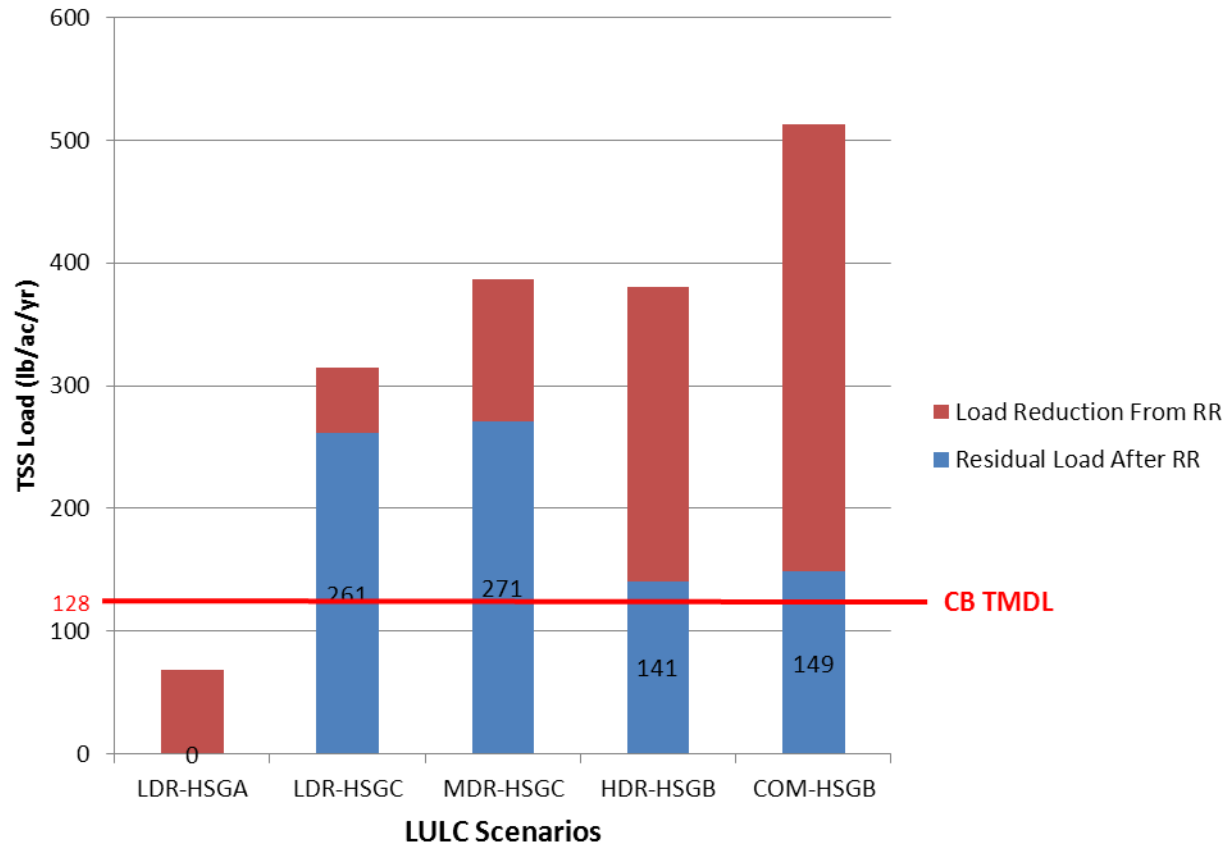
Additional Reduction to Meet TMDL-TP (lb/ac/yr)



Additional R_{Pv} Reduction to Meet TMDL-TP (cu.ft./ac.)



TSS Reduction for Various LULC Scenarios



Key

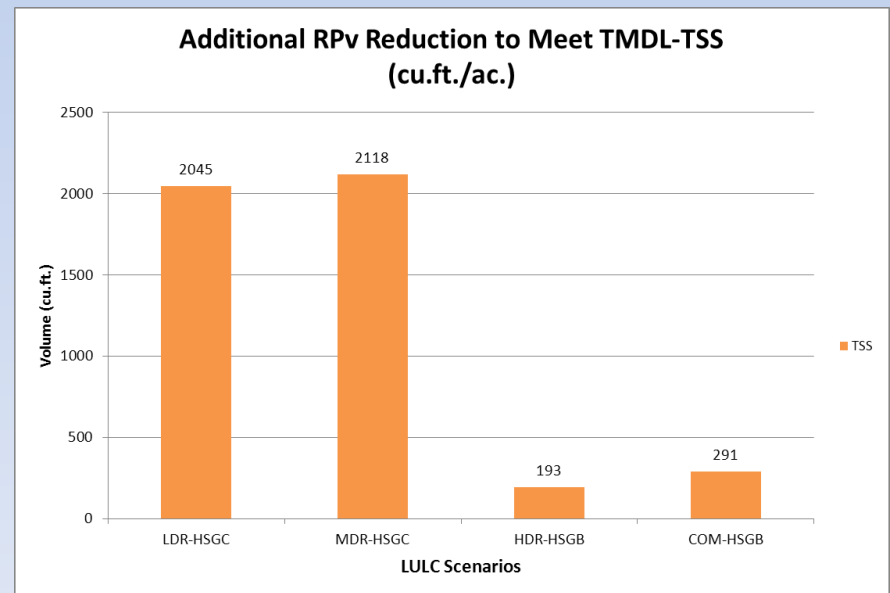
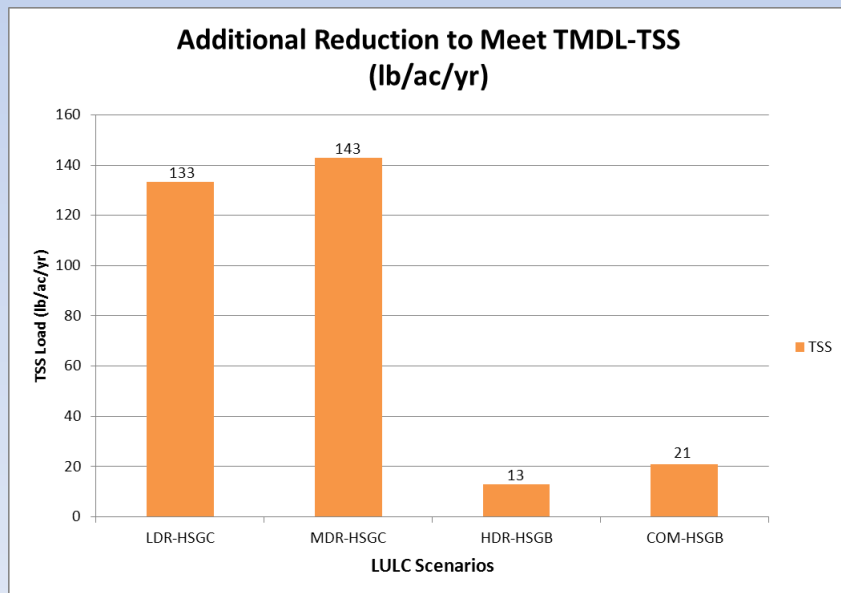
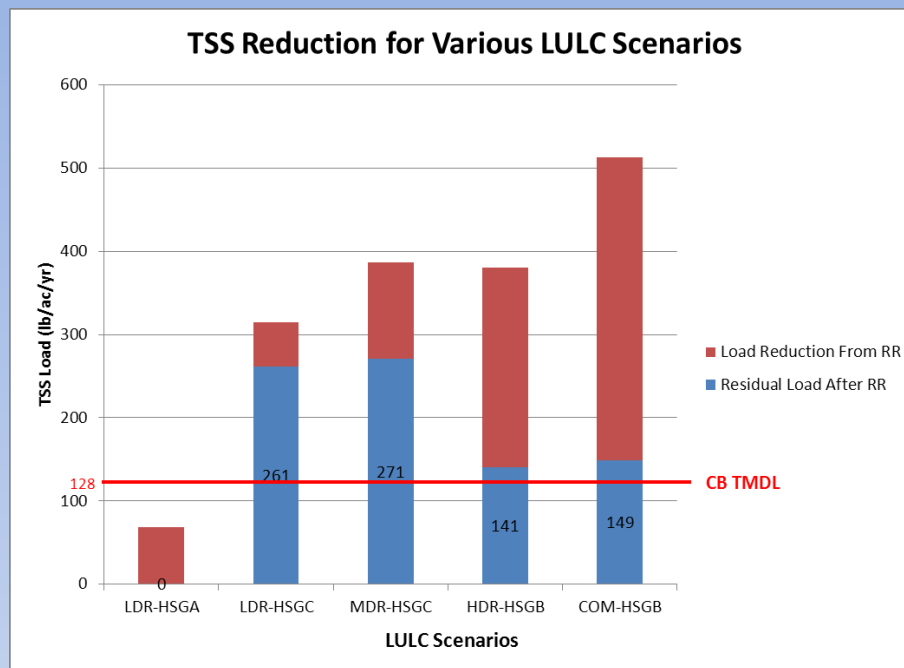
LDR-HSGA: Low Density Residential, 20% Imp., HSG A

LDR-HSGC: Low Density Residential, 20% Imp., HSG C

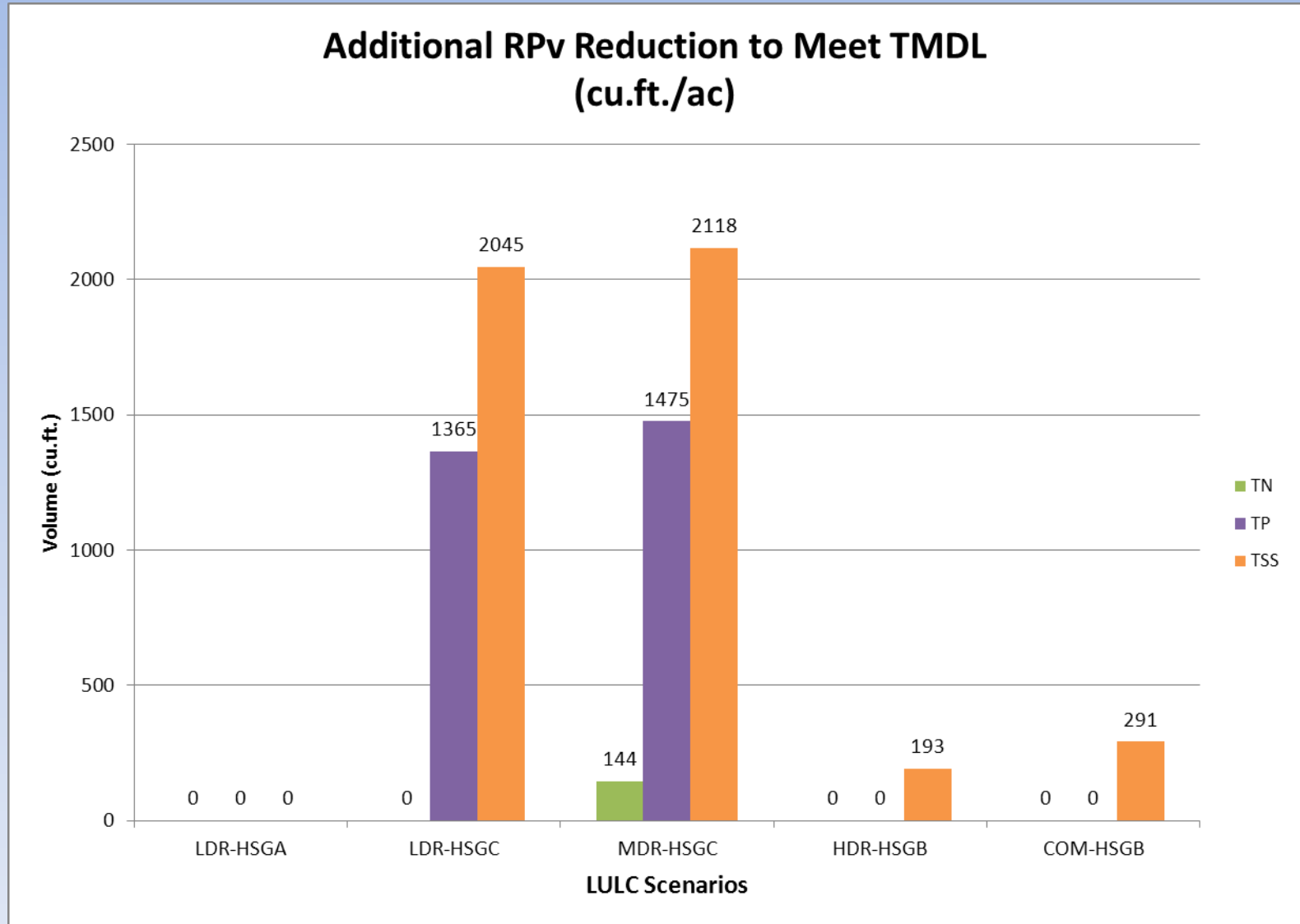
MDR-HSGC: Medium Density Residential, 40% Imp., HSG C

HDR-HSGB: High Density Residential, 60% Imp., HSG B

COM-HSGB: Commercial, 80% Imp., HSG B



w/Minimum Runoff Reduction




Treatment BMP Removal Efficiencies*

Knox County Tennessee Stormwater Management Manual

General Application Stormwater BMP

4.3.3 Dry Extended Detention Ponds



Description: A surface storage basin or facility designed to provide water quantity control through detention of stormwater runoff. A dry extended detention pond can be used for water quality treatment purposes as well as for flood control.

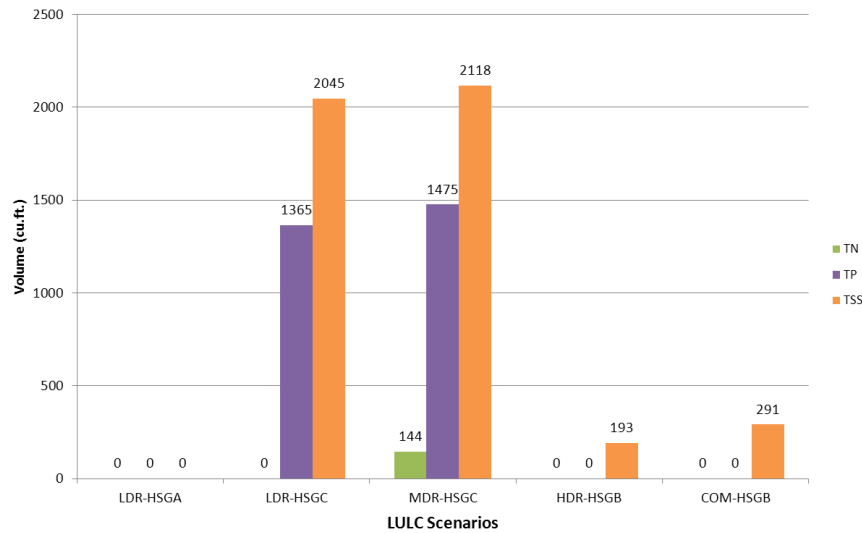
KEY CONSIDERATIONS	STORMWATER MANAGEMENT SUITABILITY
<p>DESIGN GUIDELINES:</p> <ul style="list-style-type: none">Maximum contributing drainage area of 75 acres.A sediment forebay or equivalent upstream pretreatment must be provided.Minimum flow length to width ratio for the pond is 1.5:1. The pond shall be sized to detain the volume of runoff to be treated for a minimum of 24 hours.Side slopes to the pond shall not exceed 3:1 (h:v) on one side of the pond to facilitate access. Slopes as steep as 2:1 will be allowed for other areas, with proper stabilization. <p>ADVANTAGES / BENEFITS:</p> <ul style="list-style-type: none">Moderate removal rate of urban pollutants.High community acceptance.Useful for water quality treatment and flood control. <p>DISADVANTAGES / LIMITATIONS:</p> <ul style="list-style-type: none">Potential for thermal impacts/downstream warming.Dam height restrictions for high relief areas.Pond drainage can be problematic for low relief terrain. <p>MAINTENANCE REQUIREMENTS:</p> <ul style="list-style-type: none">Remove debris from inlet and outlet structures.Maintain side slopes and outlet structure.Remove invasive vegetation.Monitor sediment accumulation and remove periodically. <p>OTHER CONSIDERATIONS:</p> <ul style="list-style-type: none">Outlet cloggingSafety benchLandscaping	<p><input checked="" type="checkbox"/> Water Quality</p> <p><input checked="" type="checkbox"/> Channel/Flood Protection</p> <p><input checked="" type="checkbox"/> Overbank Flood Protection</p> <p><input checked="" type="checkbox"/> Extreme Flood Protection</p> <p>Accepts runoff from SPAP land uses: Yes</p> <p>FEASIBILITY CONSIDERATIONS</p> <p><input type="checkbox"/> M-H Land Requirement</p> <p><input type="checkbox"/> L Capital Cost</p> <p><input type="checkbox"/> L Maintenance Burden</p> <p>Residential/Subdivision Use: Yes</p> <p>High Density/Ultra-Urban: No</p> <p>Drainage Area: 75 acres max.</p> <p>POLLUTANT REMOVAL</p> <p><input type="checkbox"/> M Total Suspended Solids</p> <p><input type="checkbox"/> L Nutrients: Total Phosphorus / Total Nitrogen</p> <p><input type="checkbox"/> L Metals: Cadmium, Copper, Lead, and Zinc</p> <p><input type="checkbox"/> No Data Pathogens: Coliform, Streptococci, E.Coli</p> <p>L=Low M=Moderate H=High</p>

Volume 2 (Technical Guidance) Page 4-57

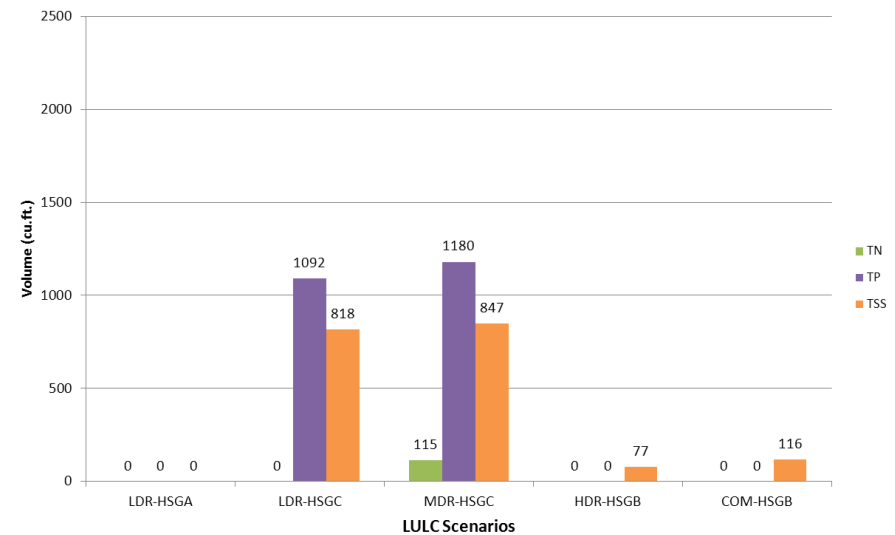
- TN: 20%
- TP: 20%
- TSS: 60%

w/Treatment BMP

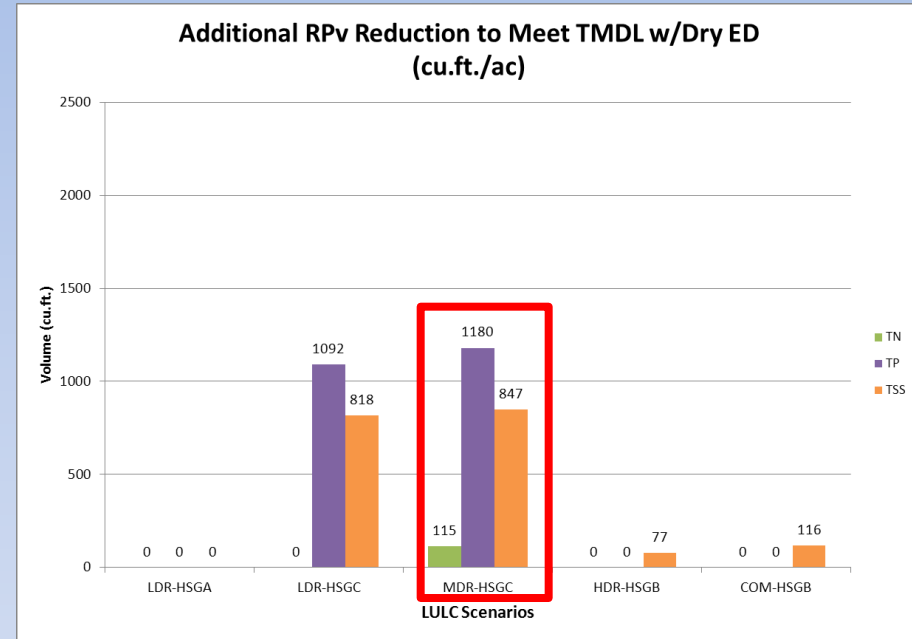
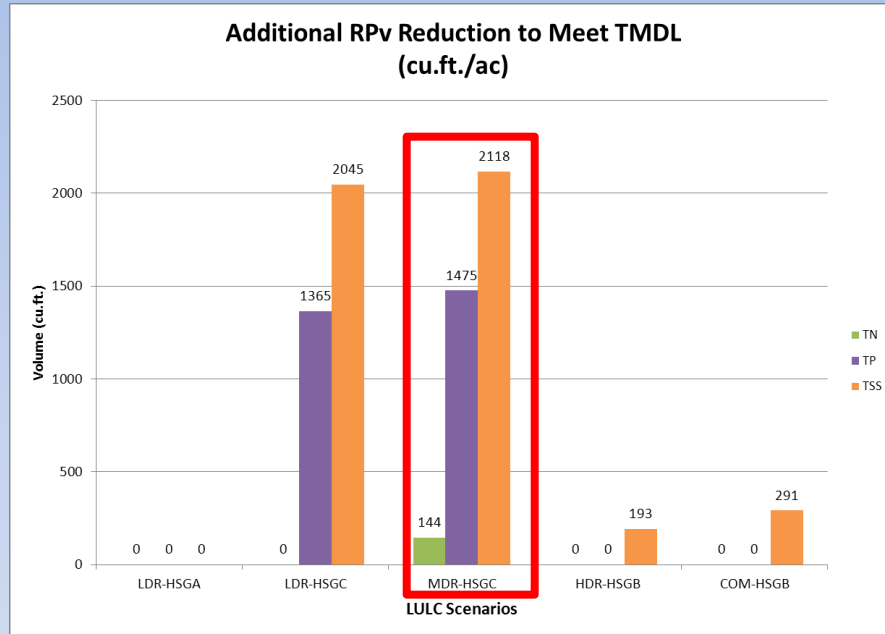
**Additional RPv Reduction to Meet TMDL
(cu.ft./ac)**



**Additional RPv Reduction to Meet TMDL w/Dry ED
(cu.ft./ac)**



Fee Comparison for MDR-HSGC



- Runoff Reduction Only: 5 ac. x 2118 cu.ft./ac x \$23/cu.ft = \$243,570
- RR + Treatment BMP: 5 ac. x 1180 cu.ft./ac x \$23/cu.ft = \$135,700